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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/075,428	02/14/2002	Richard L. Pierson JR.	01SC027US1	8755

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EXAMINER

KANG, DONGHEE

ART UNIT PAPER NUMBER

2811

DATE MAILED: 12/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/075,428

Applicant(s)

PIERSON ET AL.

Examiner

Donghee Kang

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 and 33-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7 and 16 is/are allowed.
- 6) ☒ Claim(s) 1-3, 6, 8-12, 18-21, 33-35 and 38-43 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 13-15, 17, 36, 37 and 44-47 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Acknowledgment

1. Applicant's Amendment and Response to Paper No.5 have been entered and made of Record. New claims 33-47 have been added. Thus claims 1-21 & 33-47 are pending in this application.

Response to Amendment

2. The Declaration filed on September 10, 2003 is sufficient to overcome the Blayac et al. (US 2001/0015474) reference.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims **1-3 & 33-35** are rejected under 35 U.S.C. 102(e) as being anticipated by Gutierrez-Aitken et al. (US 6,376,867).

Re claims 1-3, Gutierrez-Aitken et al. teach a heterojunction bipolar transistor, comprising (Fig.5):

successive emitter (522), base (520) and collector (518) layers, a thermally conductive InGaAs contact layer (532) between said collector and sub-collector layer

(516) layers, wherein said contact layer has a thickness in the approximate range of 100-200 Angstroms.

Gutierrez-Aitken et al. do not explicitly teach the contact layer having a lateral conductivity inadequate for it to function by itself as a contact to the collector layer, but functioning as an electrical conductor between said collector and sub-collector layer. However, this feature is inherent because they both have same material and same thickness.

5. Claims **18-21** are rejected under 35 U.S.C. 102(e) as being anticipated by Tanomura (US 6,403,436).

Re claim **18**, Tanomura teaches a heterojunction bipolar transistor, comprising (Fig.1):

successive emitter (102), base (103) and collector (104) layers, said emitter, base and collector layers being surrounded laterally by air gaps for lateral isolation and an InP sub-collector (106) layer having an electrically insulative portion (11) which laterally surrounds and electrically isolates the HBT,

Re claim **19**, Tanomura teaches said sub-collector layer extends laterally beyond said collector layer (104), with said insulative portion located lateral to said collector layer.

Re claim **20**, Tanomura teaches said insulative portion of the sub-collector layer including implanted ions and associated trapped conductors (Col.6, lines 44-48).

Re claim **21**, Tanomura teaches said ions have a more uniform than Gaussian distribution through the thickness of said sub-collector layer.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims **6, 8, 38 & 39** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gutierrez-Aitken et al. in view of Katoh (US 5,041,882).

Re claims **6 & 38**, Gutierrez-Aitken et al. teach the sub-collector layers includes a function portion aligned with said collector layer. Gutierrez-Aitken et al. do not teach an electrically insulating portion lateral to said collector layer and outside the area of said functional sub-collector portion to electrically isolates said HBT.

Katoh in Fig.1 teaches an electrically insulating portion (13) lateral to said collector layer (3) and outside the area of said functional sub-collector portion to electrically isolates said HBT. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the isolation region of Katoh into the Blayac's device in order to isolate the HBT from other elements.

Re claims **7 & 38**, Gutierrez-Aitken et al. do not teach said insulating portion of the sub-collector layer including implanted ions and associated trapped conductors. Katoh teaches that the insulative portion (13) of the sub-collector layer includes implanted ions, hydrogen ions, (Col.7, lines 28-30). Katoh does not expressly teach that

the hydrogen ions are associated trapped conductors. However, this feature is inherent in Katoh's device because implanted ions, both in this invention and in Katoh, comprises hydrogen ions.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the insulating portion using ion implantation, since the ion implantation has a several advantages, such as ability to more precisely control the number of implanted dopant atoms into substrate.

8. Claims **9-12 & 40-42** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gutierrez-Aitken et al. In view of Micovic et al. (US 6,583,455).

Gutierrez-Aitken et al. teach substantially the claimed invention, as explained above in claim 1, except that emitter layer comprises InP or InAlAs and base layer comprises InGaAs. However, Micovic et al. in Fig.4 teach InP emitter layer (15) and InGaAs base layer (14). Thus, it would have been obvious to one of ordinary skill in the art to form the emitter and base layers using InP & InGaAs, respectively taught by Micovic in Gutierrez-Aitken's device, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as matter of obvious design choice. In re Leshin, 125 USPQ 416.

9. Claim **12 & 43** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gutierrez-Aitken et al. (US 6,376,867) in view of Micovic and further in view of Katoh (US 5,041,882).

Neither Gutierrez-Aitken et al. nor Micovic teach the sub-collector (collector contact) layer in doped N+. Katoh in Fig.1 teaches an n-type heterojunction bipolar transistor including a heavily doped (n+) collector contact layer (2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select a conductivity type in order to form a desired device having an appropriate conductivity type. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form heavily doped collector contact in Gutierrez-Aitken's device in order to enhance a conductivity of contact layer, hence to improve charges collecting.

Allowable Subject Matter

10. Claims 7 & 16 are allowed.

11. Claims 3-4, 13-15, 17, 36-37 & 44-47 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims

The following is a statement of reasons for the indication of allowable subject matter: Prior art references, taken along or in combination, do not teach or render obvious that the contact and sub-collector layers extends lateral to said collector layer.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Maxiflex.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C Lee can be reached on 703-308-1690. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Donghee Kang
Examiner
Art Unit 2811

dhk